Public Support For Hosting The Olympic Summer Games In Germany: The CVM Approach

By: Pamela Wicker, **John C. Whitehead**, Daniel S. Mason, & Bruce K. Johnson

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Public support for hosting the Olympic Summer Games in Germany: The CVM approach

Pamela Wicker
German Sport University Cologne, Germany

John C Whitehead
Appalachian State University, USA

Daniel S Mason
University of Alberta, Canada

Bruce K Johnson
Centre College, USA

Abstract
Cities and their respective regions must weigh the merits of hosting major sport events, including the Olympic Games. This paper presents a contingent valuation method estimate of the monetary value of intangible benefits to Germans of hosting the Olympic Summer Games. In a nationwide online survey, 6977 respondents said whether they would support a referendum to host the Games. The survey employed a payment card format containing monthly tax amounts to elicit individual willingness-to-pay for the Games over a five-year period. In the weighted sample, 26% expressed an average willingness-to-pay of € 51. Willingness-to-pay varied widely across regions. Around Cologne, the average willingness-to-pay was € 100. Interval data hurdle models reveal that policy consequentiality and various intangible benefits increased willingness-to-pay. Aggregate willingness-to-pay over a five-year period amounted to € 46 billion which exceeded the estimated costs of the 2024 Summer Games for Hamburg. The findings have implications for policy makers since they show what regions within Germany most support hosting the Games.

Keywords
contingent valuation method, host city, intangible benefit, Olympic Games, willingness-to-pay

Corresponding author:
Pamela Wicker, German Sport University Cologne, Department of Sport Economics and Sport Management, Am Sportpark Muengersdorf 6, Cologne, NRW, 50933, Germany.
Email: p.wicker@dshs-koeln.de

Introduction

Despite substantial costs and questionable economic benefits, cities willingly compete to host major sporting events (Burbank et al., 2001). While this may reflect pro-growth city elites pursuing their interests (Amin, 2003; Thornley, 2002), some research shows that cities may receive intangible, non-pecuniary benefits from hosting sport teams and events (Santo, 2008) and that 'the Olympic Games represent the biggest prize for cities seeking mega-events' (Holcomb, 1999: 59).

In March 2015, the German Olympic Sports Confederation decided to submit a bid for Hamburg to host the 2024 Olympic Summer Games. Because the International Olympic Committee (IOC) makes prospective cities consider public opinion before they bid, Hamburg held a referendum on hosting the Games in late November 2015. The outcome of the referendum was a 'no' vote. Elsewhere in Germany, a lack of public support stalled Munich's chance to host the 2018 and 2022 Winter Olympic Games, most recently in 2013 when citizens of Munich and three nearby districts failed to support a 2022 bid. The question arises, to what extent do Germans favor hosting Olympic Games, and which cities/regions support it?

'Public support is crucial in supporting cultural activities and, more generally, for developing the civic amenities that become "key" assets of the city' (Begg, 1999: 800). Presumably, local support for hosting the Olympics should depend on the benefits, both tangible and intangible, voters expect to receive. Research on tangible benefits of hosting, such as economic impact or labor market outcomes of the Games (Baade et al., 2010; Feddersen and Maennig, 2013) has established that benefits are often overstated, particularly when estimated ex ante (Porter and Fletcher, 2008). Consequently, tangible economic benefits cannot justify local support for event hosting.

However, tangible benefits are only part of the story. Intangible benefits of sport events include national and civic pride, general feel-good-factors and image improvements (Johnson, 2008; Kavetsos and Szymanski, 2010; Rowe and McGuirk, 1999). These intangibles are public goods characterised by non-excludability and non-rivalry (Downward et al., 2009). Since quantities and prices cannot be observed for non-traded public goods, it is difficult to assign monetary values to them. The contingent valuation method (CVM) can do so

(Carson, 2000). A CVM survey presents respondents with a hypothetical scenario and asks to state their willingness-to-pay (WTP) for the public good described in the scenario (Carson, 2000).

The purpose of this study is to estimate the monetary value of intangible benefits to Germans of hosting the Olympic Summer Games using CVM. We advance three main research questions: (1) what are the individual and aggregate WTP of the German population for hosting the Summer Olympics? (2) Which German regions value hosting the Games the most? And (3) what factors influence individual WTP? Data were collected nationwide from December 2013 to March 2014 using an online survey. It asked respondents to state their likelihood of supporting a referendum to host the Summer Games and presented them with a payment card containing monthly amounts of a five-year tax to finance the Games. Our findings have policy implications since they show which regions support hosting the Olympics. This study contributes to the developing body of stated preference literature within urban studies.

The following section discusses CVM, passive-use values, incentive compatibility and consequentiality, along with previous CVM studies on hosting the Olympics, and outlines this study's contribution. The methods section describes the questionnaire, the sample and empirical analysis strategy. After presenting and discussing the results, the article finishes with some concluding remarks.

Conceptual framework and previous research findings

CVM and passive-use values

The CVM is 'the only feasible method for including passive-use considerations in an economic analysis' (Carson, 2000: 1413). A traditional economic perspective has been that consumers must directly use a good to get utility from it – its monetary value is its use value. But consumers may also get utility without physically using a good. That utility is referred to as passive-use or non-use value (Carson, 2000). The intangible benefits of hosting sport events noted earlier fall into this category. People need not purchase tickets and attend Olympic events to get utility from them (Humphreys et al., 2016).

For example, Kavetsos and Szymanski (2010) showed that hosting football events creates a feel-good factor. Pawlowski et al. (2014) concluded that hosting events raises subjective wellbeing even more than the pride from sporting success. Hiller and Wanner (2014) documented that Olympic hosting produces psycho-social benefits and that the festival atmosphere positively affects the public mood. This study estimates the monetary value of these intangible benefits from hosting Olympic Games.

Incentive compatibility and consequentiality in CVM

Carson and Groves (2007) and Carson (2012) argued that stated preference surveys with incentive compatible, consequential valuation questions produce accurate WTP estimates. A question is *incentive compatible* if it induces respondents to reveal their true preferences, i.e., respondents answer in the same way as if they were making a real choice or payment (Carson et al., 2014; Cummings et al., 1995). With incentive compatible questions, respondents neither underestimate nor overestimate their WTP, avoiding hypothetical bias. For example, a referendum with majority rule is incentive compatible because there are no incentives for strategic response. In contrast, an open-ended question, e.g. how much are you willing to pay?, invites strategic behaviour. Respondents who want the policy, but do

not think they will actually pay may exaggerate their WTP in order to increase the probability that the policy will pass. Those who desire the policy, but do not want to pay, may understate their true WTP so they can free ride. Those willing to pay an amount greater (less) than the cost of the policy should vote in favour of (against) the policy.

Incentive compatibility is also affected by the payment vehicle (Wiser, 2007): a collective and coercive payment mechanism such as a tax increase is considered more incentive compatible than a voluntary payment mechanism, e.g. donation to a voluntary fund, because expectations about the payments of others affect WTP (Wiser, 2007). While a tax ensures that all citizens pay, a donation invites free riding because people may benefit from the potential supply of the good without paying. Moreover, the type and context of a WTP question is critical: for example, dichotomous choice questions are not considered incentive compatible (Cummings et al., 1995), while referendum questions have been found to be incentive compatible (Carson et al., 2014).

A question is *consequential* if respondents believe their response might affect something they care about (Groothuis et al., 2015). It is assumed that 'hypothetical behavior will be similar to real behavior if there is a positive chance that the hypothetical behavior will have real consequences' (Groothuis et al., 2015: 4). A perceived lack of consequentiality can lead to protest responses (Groothuis and Whitehead, 2009).

Carson and Groves (2007) argued that respondents have little incentive to invest effort in an inconsequential survey, but do have incentives in a consequential survey to respond truthfully. While theory makes no predictions about the effect of consequentiality on WTP, mounting empirical evidence from laboratory and field experiments indicates that consequential hypothetical questions lead to more accurate statements of value (Carson et al., 2014; Landry and List, 2007; Vossler and Evans, 2009). Vossler and Watson (2013) and Groothuis et al. (2015) found that perceived inconsequentiality reduces stated WTP.

Application of CVM in sport in an urban context

The CVM has been used to estimate the monetary value of public goods in an urban context. For example, Johnson and Whitehead (2000) applied CVM to stadiums and Johnson et al. (2001) to professional sports teams. Other studies followed, with Barlow and Forrest (2015) estimating WTP for small-town football clubs and Harter (2015) for a town arena. Johnson et al. (2012) examined WTP for a new arena with non-sport amenities to enhance downtown vibrancy.

CVM studies on hosting the Olympic Games

This section reviews existing studies estimating the monetary value of public goods created by hosting the Olympic Games. Two studies focused on London's bid for the 2012 Summer Olympics; London's bid was supported by the British government following a decision in April 2003. In September 2004, Atkinson et al. (2008) conducted face-to-face interviews in London (n = 602), Manchester (n = 151) and Glasgow (n = 152). The authors acknowledged that the Manchester and Glasgow samples were not representative, but did not comment on whether the London sample was representative or whether any corrective measures were taken. Their CVM payment vehicle was an increase in the household's annual council tax bill. They elicited WTP using a payment card. Average household WTP in London (£22) exceeded those in Manchester (£12) and Glasgow (£11).

The decision to award the 2012 Olympics to London was made by the IOC on 6 July 2005. Walton et al. (2008) conducted face-to-

face surveys in public areas in Bath (n = 167) from end of April to beginning of July 2005. Comparison with census data shows that the sample is representative of Bath's population. But the survey timing, just weeks before the decision to give the Games to London, suggests that perceived policy consequentiality was probably low. The payment vehicle was a national fixed-rate tax. WTP was elicited in a double-bounded dichotomous choice format. Mean individual WTP was £70 and aggregated WTP was approximately £5.8 million for Bath, supporting the notion that non-Londoners valued public goods from London hosting the Olympics.

In 2007, Heisey (2009) conducted public intercept surveys to determine WTP for hosting the 2016 Summer Olympics in Berlin (n = 499), San Francisco (n = 544), and Chicago (n = 342). Chicago was added after San Francisco dropped its bid during the data collection phase. The CVM payment vehicle was a donation to a private organisation. A payment card was used to elicit WTP. The sample structure was not compared with the cities' population, although the average age of the respondents, i.e., between 32 and 37 years, seems relatively young. Average individual WTP in Chicago (US$55) exceeded those in San Francisco (US$36) and Berlin (€16). Aggregate yearly WTP was €81.75 million in Berlin, US$154.15 million in San Francisco, and US$439.1 million in Chicago.

In April 2014, Coates and Szymanski (2015) examined the WTP to host the 2024 Summer Olympics in the USA, when four cities were trying to be the US bidder. North American University students organised the data collection. The sample consisted of people paid ten cents to complete the survey through a Mechanical Turk employment site. The CVM scenario proposed that the Games would be hosted in the respondent's region. The payment vehicle was a one-time lump sum tax. A closed-ended question with seven answer categories elicited WTP. With 63% males and an average age of 19.6 years, the final sample (n = 1768) is not representative of the population, but no corrective actions were taken. Average individual WTP of the full sample amounted to US$138, ranging from US$93 in the Mountain region to US$151 in the Mid Atlantic.

Preuss and Werkmann (2011) estimated the experiential value of hosting the 2018 Winter Olympic Games in Munich, Germany. They interviewed 1011 people in public places in the Rhine–Main-region, which is at least three hours away from Munich. Males and young people were overrepresented, but no corrective measures were taken. The CVM scenario did not specify a payment vehicle. A payment card was used to elicit individual WTP. Mean WTP was not reported. Aggregate WTP was between €617 million to €803 million.

These previous studies also examined the determinants of WTP. Males reported higher WTP than females (Coates and Szymanski, 2015; Walton et al., 2008). Age had a negative effect in one study (Walton et al., 2008), and was insignificant in others (Atkinson et al., 2008; Coates and Szymanski, 2015; Preuss and Werkmann, 2011). Income had a positive effect on WTP (Atkinson et al., 2008; Coates and Szymanski, 2015; Heisey, 2009; Preuss and Werkmann, 2011; Walton et al., 2008), as did a general interest in sport and organised exercise (Preuss and Werkmann, 2011; Walton et al., 2008). People expecting benefits from the event (Preuss and Werkmann, 2011) had a higher WTP, even more when they thought intangible benefits would be more important than tangible benefits (Atkinson et al., 2008).

Shortcomings of previous research and contribution of this study

Several shortcomings can be observed in the literature. First, some of the studies made no

attempt to compensate for unrepresentative samples. Second, some of the samples were on the small side of the 'several hundred to a couple thousand observations […] generally required to achieve reasonable reliability from a sampling (confidence interval) perspective' (Carson, 2000: 1416). Third, policy consequentiality has not yet been considered. The present study addresses these shortcomings with a large, weighted sample and by using incentive-compatible, consequential survey questions. Another contribution is that we examine the effect of consequentiality by decomposing WTP into extensive (whether WTP is positive) and intensive (the magnitude of WTP) margins.

Method

Data collection

Primary data were collected in Germany with a nationwide online survey from December 2013, a month after the Munich referendum to host the 2022 Winter Olympics failed, to March 2014. In the aftermath of Munich, German officials shifted their efforts to attract the Summer Games, without specifying a host city. Nevertheless, the failure of the referendum so soon before our survey may have affected responses.

This study is part of a larger project examining the value of sport, specifically football (soccer; Wicker et al., 2016) and Olympic Games, to the German population. Sosci Survey (www.soscisurvey.de) hosted the survey. The survey link was distributed using social media, e.g., Facebook, Twitter, city websites and local radio websites throughout Germany. Because of the football questions, the link was also posted in fan forums and fan club websites. This sampling procedure resulted in a convenience sample rather than a representative random sample.

Survey participation was limited to respondents aged 16 years or older, and the questionnaire could only be completed once per internet protocol. The survey attracted 7721 respondents. During the data cleaning process, people younger than 16 were removed as well as those clicking through the survey without thinking, e.g., completing a six-page questionnaire in less than two minutes, choosing the same answer to several consecutive questions, those providing implausible, e.g. invalid postcodes, educational level implausible for a certain age, or nonsensical answers, e.g., tenure greater than age, and those with theoretically invalid WTP responses such as increasing likelihood of WTP with increasing payments (Dickinson and Whitehead, 2015). The final sample contained 6977 observations.

Questionnaire and variables

Table 1 provides variable names and definitions. Since ordering effects may affect WTP in CVM studies including multiple valuation scenarios (Johnson et al., 2006), respondents were randomly assigned either the two football scenarios (which were presented consecutively) or the Olympic scenario first (FIRST). The Olympic section started with questions about respondents' general interest in sport. They were asked to state their level of agreement with a set of statements on a five-point Likert scale, from strongly disagree (1) to strongly agree (5). The statements referred to the respondents' interest in sport in general (INTEREST); regular sport practice (PLAY); whether they identify with Germany (IDENTIFY); whether they feel proud (PROUD) and happy (HAPPY) when German athletes and teams succeed at international competitions; whether they think Germany's reputation is burnished by German success at international competitions (REPUTATION); and whether they regard German athletes as role models (ROLEMODELS). These variables were coded as 1 if respondents replied *strongly agree* or *agree* and 0 otherwise.

Table 1. Overview of variables.

Variable	Description
PRESTIGE	Do you think Germany's prestige and standing in the world would rise if Germany hosted the Summer Olympics? (1 = yes)
POS_WTP	Positive WTP (1 if WTP $>$ € 10)
WTP	Amount of willingness-to-pay (in €) if POS_WTP = 1
FIRST	Order of Olympics scenario (1 = first scenario; 0 = third scenario)
INTEREST	I am interested in sports in general (strongly agree/agree = 1)
PLAY	I practice sport regularly, i.e., at least once per week (strongly agree/agree = 1)
IDENTIFY	I identify with Germany (strongly agree/agree = 1)
PROUD	I am proud when German athletes/teams are successful at international sport competitions (strongly agree/agree = 1)
HAPPY	I am happy when German athletes/teams are successful at international sporting competitions (strongly agree/agree = 1)
REPUTATION	It is important for the reputation of Germany that German athletes/teams are successful at international sporting competitions (strongly agree/agree = 1)
ROLEMODELS	German athletes are role models (strongly agree/agree = 1)
REFERENDUM	A referendum is a good way for citizens to express their preferences for sport in Germany (strongly agree/agree = 1)
SHARED	I believe the results of this survey will be shared with policy makers (strongly agree/agree = 1)
AFFECT	I believe the results of this survey could affect decisions on sport in Germany (strongly agree/agree = 1)
INFO	I understand all of the information presented to me in this survey (strongly agree/agree = 1)
CONFIDENCE	I have confidence in the ability of the German government to achieve the goals of sport policy (strongly agree/agree = 1)
INCOME	Individual monthly net income (from 1 = up to € 500 to 9 = over € 4000)
MALE	Gender of the respondent (1 = male, 0 = female)
AGE	Age of the respondent (in years)
TENURE	Number of years living in the city
SCHOOLING	Years of schooling
POSTCODE	Postcode area within Germany (from 0 to 9)

Afterwards, the Olympic scenario was presented:

> The Olympic Games may be the most famous and prestigious of all sporting competitions in the world. Some cities have hosted multiple Olympic Games. For instance, in 2012, London hosted its third Summer Olympics. Up to now Munich is the only German city which has hosted Olympic Games after World War II, i.e., the 1972 Summer Olympics. Its bid to host the 2018 Winter Olympics was unsuccessful. Moreover, the outcome of the referendum in the Munich region in November 2013 was that people did not support another bid of Munich for Winter Olympics.
>
> Suppose the German Olympic Sports Confederation considers submitting a bid for Olympic Summer Games in the future. To pay the extra cost of hosting the Olympics, the German government would impose a monthly income tax surcharge on each individual for the next 5 years.

Given the possibility of temporal embedding effects in CVM surveys (Johnson et al., 2006), the duration of the monthly tax payment, five years, was clearly specified. The survey opened a few weeks after the Munich referendum failed and before any bid cities had been mentioned in the media. Because it

was not clear if one of the German cities which applied previously for Olympic Summer Games, i.e., Berlin for the 2000 Games, Leipzig for the 2012 Games, or a city that was eliminated in an intra-German competition in 2003, i.e., Stuttgart, Frankfurt, Düsseldorf, Hamburg, or another city would be the preferred German bidder, the survey did not specify a host city. This avoided the possibility that the German Olympic Sports Confederation might name different potential hosts during the survey period, adversely affecting responses. Since the survey was also administered to citizens of the Munich region, assuming that the Olympics would be hosted close to the respondents' home would not be realistic given the failed referendum.

Respondents were then asked if they thought Germany's world prestige and standing would rise if Germany hosted the Summer Olympics (PRESTIGE). Then they were asked, 'Suppose that this proposal was put to a referendum vote for all Germans … how likely do you think it is that you would vote for the proposal at the following tax amounts?'. Respondent's likelihood of voting for specific tax amounts was assessed on a five-point scale, from very unlikely (1) to very likely (5). Respondents were presented with a payment card including seven different tax amounts (€ 10, € 25, € 50, € 100, € 150, € 200 and € 250). This question eliciting individual WTP was incentive-compatible and is expected to result in more conservative WTP estimates compared with a dichotomous choice referendum question.

Two variables resulted from the scenario. The first is POS_WTP which is equal to 1 if the respondent is very likely to support the referendum at € 10 or higher. Respondents who said they would only be *somewhat likely* to vote in favour were coded as no votes to mitigate hypothetical bias (Loomis, 2011). In the case of POS_WTP = 1, the second variable is WTP which was coded at the midpoint of a *very likely* vote and next highest amount at some less likely response. For example, if a respondent stated *very likely* to € 10 and *somewhat likely* to € 25, then WTP was coded at € 17.50.

After the scenario, respondents stated their level of agreement with several policy related statements on a five-point Likert scale. They were asked whether they thought a referendum would be a good way for citizens to express their preferences (REFERENDUM); whether they believed the survey results would be shared with policy makers (SHARED); whether they believed the results would affect decisions on sport in Germany (AFFECT); and whether they had confidence in the ability of the German government to achieve the goals of sport policy (CONFIDENCE). Moreover, a statement capturing whether respondents understood the information in the survey was included (INFO). These variables were recoded as 1 when the respondents replied *strongly agree* or *agree* and 0 otherwise. The questionnaire finished with questions about socio-economic characteristics including gender (MALE), age (AGE), education (SCHOOLING), postcode (POSTCODE), number of years lived in the current city (TENURE), and personal monthly net income (INCOME). For income, the midpoint Euro value of the respective income category was used (Liebe, 2007). The natural logarithm was deemed appropriate because its distribution is closer to the normal distribution.

Initial sample and use of weights

In the initial sample, 76% of the respondents were male and the average age was 31.7 years. In comparison, 48% of the German population aged 15 or older is male, and the average age is 44 years (Federal Statistical Office, 2015). Thus, males and younger people are over-represented in the initial sample.

Several circumstances may explain the non-representative sample. First, the link to the survey informed potential respondents that the survey was about sports, a topic of greater interest to young males (Downward and Rasciute, 2010). Bundling Olympic and football topics may have intensified the self-selection of younger males, since the typical German football fan is a young male (Schmidt and Högele, 2011). Second, the sampling strategy and use of an online survey may have affected the sample structure. We chose an online survey over mail surveys for several reasons: online surveys are faster and cheaper (Dillman et al., 2014); online surveys can require answers before allowing respondents to move to the next question, reducing the likelihood of incomplete responses; and the survey design required randomising the order of scenarios, which is easy to do in online surveys.

Disadvantages of online convenience sampling include missing people who are less inclined or able to participate in online surveys, which might have contributed to such a young and male sample. Although a large part of the population is *online* nowadays, the extent of Internet usage still differs between population groups. Recent research shows that younger people and males are more active online than older people and females (Drabowicz, 2014; van Deursen et al., 2015) which may explain the difference between the initial sample and the German population.

To compensate, we weighted the sample for age, gender, and region (postcode area). Since sample size and composition are critical to the reliability of CVM studies, using appropriate weights is recommended for non-representative samples (Carson, 2000). We calculated weights based on detailed population statistics provided by the German Federal Statistical Office (2015). Table 2 reports characteristics of the unweighted and weighted sample. Using weights increased average age, income and tenure, and reduced the proportion of males. The mean values of other variables changed little.

The problem of non-responses could not be fully addressed. The sampling strategy and the anonymity of the survey compromise the use of measures to adjust for non-responses. One common option for dealing with non-response is to use sample weights based on different selection probabilities (Carkin and Tracy, 2014). But this procedure could not be applied. Because our sample was anonymous, we do not know the characteristics of non-respondents. Anonymous sampling also prevents us from reminding non-respondents to respond, a common procedure when identities of survey recipients are known (Hansen et al., 2014). While these procedures could not be applied, weighting the sample partially accounts for non-response and drop-outs and, thus, mitigates sample bias (Höfler et al., 2005). Altogether, this large data set allows an interesting and valuable analysis in terms of originality, significance, and rigour of the underlying research.

Empirical analysis

The empirical analysis is based on the weighted sample. Two empirical issues must be considered. First, given its prominence in the CVM scenario, PRESTIGE is a potentially endogenous variable. We attempted several models for estimating the effect of PRESTIGE on WTP including an instrumental variable model (Pawlowski et al., 2014), but could not identify suitable instruments when using the sample with regional weights. As an alternative we estimated a bivariate probit model with PRESTIGE and POS_WTP as the dependent variables – similar to Morgan and Whitehead (2015). The bivariate probit model estimates the correlation in error terms which captures the correlation in unexplained variation.

Second, some applications of the CVM lead to a large number of zero WTP responses. A Tobit model could be

Table 2. Summary statistics (n = 6977).

	Unweighted sample		Weighted sample			
Variable	Mean	SD	Mean	SD	Min	Max
PRESTIGE	0.66	–	0.59	–	0	1
POS_WTP	0.28	–	0.26	–	0	1
WTP	49.71	62.04	51.38	94.30	17.5	275
FIRST	0.50	–	0.51	–	0	1
INTEREST	0.86	–	0.79	–	0	1
PLAY	0.64	–	0.58	–	0	1
IDENTIFY	0.75	–	0.71	–	0	1
PROUD	0.70	–	0.67	–	0	1
HAPPY	0.68	–	0.64	–	0	1
REPUTATION	0.65	–	0.63	–	0	1
ROLEMODELS	0.72	–	0.69	–	0	1
REFERENDUM	0.53	–	0.51	–	0	1
SHARED	0.49	–	0.53	–	0	1
AFFECT	0.28	–	0.28	–	0	1
INFO	0.81	–	0.80	–	0	1
CONFIDENCE	0.26	–	0.23	–	0	1
INCOME	1647.74	1213.71	1970.90	1233.15	250	4250
MALE	0.76	–	0.48	–	0	1
AGE	31.70	12.30	44.53	15.51	16	99
TENURE	19.38	14.38	26.47	18.43	0	90
SCHOOLING	13.74	2.91	13.55	3.23	5	17
POSTCODE						
0	0.02	–	0.08	–	0	1
1	0.03	–	0.09	–	0	1
2	0.04	–	0.10	–	0	1
3	0.04	–	0.11	–	0	1
4	0.22	–	0.12	–	0	1
5	0.11	–	0.11	–	0	1
6	0.15	–	0.09	–	0	1
7	0.11	–	0.11	–	0	1
8	0.18	–	0.10	–	0	1
9	0.10	–	0.09	–	0	1

estimated, but whether a respondent would be willing to pay anything at all may depend upon different factors than does the amount of payment (Castellanos et al., 2011). If so, a hurdle model should be estimated, where a probit model is fit to the first decision and a continuous regression model is fit to the second. Hurdle models are useful when extensive and intensive margins are investigated using data with a large proportion of zero responses (Castellanos et al., 2011; Humphreys et al., 2010). In this case Tobit models would lead to misleading inferences (del Saz-Salazar and Rausell-Köster, 2008). Thus, a hurdle model was preferred.

With our data, where the continuous WTP is estimated between intervals, the grouped or interval data hurdle model is appropriate (Cameron and Huppert, 1989). A comparison with an OLS model supported the choice of the interval regression. Our final model can be described as follows:

$$\text{Bivariate Probit} : \text{PRESTIGE} = f(X), \quad \text{POS\_WTP} = f(X), \rho \tag{1}$$

$$\text{Interval regression} : \text{LN(IWTP)} = f(X) \tag{2}$$

where ρ is the correlation in error terms between PRESTIGE and POS_WTP, IWTP = 1 if WTP $<$ 25, 2 if 25 $\leq$ WTP $<$ 50, 3 if 50 $\leq$ WTP $<$ 100, 4 if 100 $\leq$ WTP $<$ 150, 5 if 150 $\leq$ WTP $<$ 200, 6 if 200 $\leq$ WTP $<$ 250, 7 if WTP $\geq$ 250. Hence, IWTP was obtained by transferring the WTP Euro values calculated earlier into numbers from 1 to 7.

Previous research has found that respondents who think that the survey results will affect policy decisions, i.e., the survey is consequential, are willing to pay significantly more than others (Groothuis et al., 2015). Our measurement of consequentiality and decomposition of WTP with the hurdle model provides additional insights into this result. We included measures for whether respondents think the survey results will be shared with decision makers (SHARED) and whether the results will affect decisions (AFFECT).

Results and discussion

The summary statistics (Table 2) of the weighted sample show that 26% would be willing to pay a monthly income tax over a five-year period of at least € 10 to host the Olympic Summer Games. For those willing to pay, average individual WTP is € 51, much higher than the € 16 found by Heisey (2009), who estimated WTP for Berlin hosting the 2016 Summer Games. However, his sample was smaller, not representative, and not weighted. Our result is similar to the average € 46 WTP identified by Wicker et al. (2015) for Olympic medal success, i.e., for Germany being ranked first in the final medal table. Thus, the intangible benefits from hosting Olympic Games are of similar magnitude as the intangible benefits from medal success. The statistics of the remaining variables can be obtained from Table 2.

The regression results are summarised in Table 3. The bivariate probit model examines the determinants of prestige and a positive WTP, while the interval regression estimates the drivers of the amount of stated WTP. The bivariate probit model shows that PRESTIGE and POS_WTP are both affected by various intangible benefits such as pride derived from sporting success, enhanced reputation from hosting the Games, and viewing athletes as role models. Anticipation of positive and intangible effects was also positively associated with WTP in previous research (Atkinson et al., 2008; Preuss and Werkmann, 2011).

Moreover, playing sports, identification with Germany, and confidence the German government can achieve its sport policy goals significantly increase the probability of a positive WTP, while simultaneously reducing the WTP amount. This change in the sign on the coefficient can also be observed for the reputation and confidence variables. Previous research also documented that positive WTP and amount of WTP are affected by different factors (Liebe et al., 2011), supporting the two-fold decision. Our models reveal that Germans support hosting the Olympics, but object to funding it through taxes, suggesting that the payment vehicle plays a role. Recent examples of inefficient government spending, e.g., Airport Berlin-Brandenburg, Hamburg Elb Philharmonics, Stuttgart 21, have led to a negative attitude in general towards large-scale projects in Germany (Könecke et al., 2016). Hence, many Germans may oppose paying more taxes to the government for such projects. Breuer and Hallmann (2011), for instance, found that only 15.3% of respondents preferred the government to support Olympic athletes, while 43.4% favoured a sport federation and 33.5% preferred a foundation.

Not only trust in the institution taking care of the money may play a role, but also the universality of a payment vehicle. Income taxes, used here and in prior studies, are relevant to people participating in the

Table 3. Determinants of prestige and WTP (weighted sample; bivariate probit and interval regression model).

	Bivariate probit				Interval regression	
	PRESTIGE		POS_WTP		LN(WTP)	
	Coeff.	*t*	Coeff.	*t*	Coeff.	*t*
Intercept	−0.554*	−3.45	−1.73*	−9.86	1.609*	4.34
FIRST	−0.106*	−3.26	0.309*	8.81	−0.474*	−6.86
INTEREST	−0.059	−1.33	−0.055	−1.10	−0.049	−0.48
PLAY	−0.090*	−2.54	0.075*	1.96	−0.261*	−3.47
IDENTIFY	0.229*	5.06	0.270*	5.25	−0.222*	−1.98
PROUD	0.133*	2.55	0.173*	3.15	0.058	0.49
HAPPY	−0.066	−1.39	0.147*	2.92	0.236*	2.21
REPUTATION	0.520*	13.31	0.150*	3.47	−0.300*	−3.37
ROLEMODELS	0.346*	9.12	0.232*	5.45	0.352*	3.73
REFERENDUM	0.108*	3.21	0.138*	3.80	−0.060	−0.84
SHARED	−0.033	−0.90	−0.008	−0.20	0.019	0.24
AFFECT	0.022	0.55	0.104*	2.53	0.200*	2.54
INFO	0.014	0.33	0.122*	2.65	0.211*	2.20
CONFIDENCE	0.291*	6.98	0.219*	5.26	−0.158*	−2.04
LN(INCOME)	0.013*	3.58	0.023	0.98	0.189*	4.14
MALE	0.112*	3.13	−0.057	−1.46	0.274*	3.55
AGE	−0.010*	−7.55	−0.003*	−2.29	−0.013*	−4.51
TENURE	0.0004	−0.37	0.001	0.92	0.005*	2.18
SCHOOLING	−0.003	−0.47	−0.009	−1.58	0.040*	3.48
POSTCODE_0	−0.108	−1.04	−0.102	−0.88	−0.014	0.28
POSTCODE_1	−0.072	−0.82	0.240*	2.57	0.283	1.56
POSTCODE_3	0.185*	2.25	−0.266*	−2.93	−0.554*	−2.74
POSTCODE_4	0.038	0.50	0.265*	3.13	−0.167	−0.97
POSTCODE_5	−0.069	−0.87	0.093	1.08	0.129	0.74
POSTCODE_6	−0.169*	−2.18	0.148	1.73	−0.217	−1.26
POSTCODE_7	0.049	0.62	0.037	0.42	−0.237	−1.33
POSTCODE_8	−0.130	−1.61	0.117	1.31	0.318	1.78
POSTCODE_9	−0.005	0.06	0.127	1.35	0.278	1.51
Rho	0.494*	25.03				
Sigma					1.252*	34.26
LL	−7618.36				−2439.00	
n	6977		6977		1997	

Note: *$p < 0.05$; reference is POSTCODE_2 (Hamburg region).

labour force and to retirees, as pensions are also taxed in Germany. Nevertheless, the survey may have been perceived as less consequential by people not drawing a salary or a pension, or whose low incomes are not taxed. While we do not control for employment status in our models, the income effect should be able to explain some of this variation.

Regarding consequentiality, respondents who think this survey's results will affect German sport policy are significantly more likely to report a positive WTP. Furthermore, WTP is 22% higher when respondents think it will affect policy. The positive relationship between policy consequentiality and WTP is consistent with previous research (Groothuis et al., 2015; Vossler and Watson, 2013); yet these studies used different measures of consequentiality. The insignificance of the SHARED variable

Table 4. WTP by postcode area and aggregate WTP.

Postcode area	POS_WTP	WTP		Total population	Aggregate WTP[a]
(included states and cities)	Mean	Mean	SD	(in million)	(in million €)
0 (Saxony incl. Leipzig, Eastern Thuringia, Southern Saxony-Anhalt, Southern Brandenburg)	0.171	38.91	38.79	6.4	1917
1 (Berlin, Brandenburg, Mecklenburg-West Pomerania)	0.285	71.33	125.64	7.0	4963
2 (Hamburg, Bremen, Schleswig-Holstein, Northern Lower Saxony)	0.203	51.31	94.31	8.6	3974
3 (Southern Lower Saxony incl. Hanover, Eastern North Rhine-Westphalia, Northern Hesse, Northern Saxony-Anhalt)	0.198	31.11	59.90	8.8	2398
4 (Northwestern North Rhine-Westphalia incl. Düsseldorf, Western Lower Saxony)	0.316	38.85	68.51	10.1	5543
5 (Southern North Rhine-Westphalia incl. Cologne; Northern Rhineland Palatinate)	0.267	100.01	154.65	9.1	10,847
6 (Southern Hesse incl. Frankfurt, Southern Rhineland Palatinate, Saarland)	0.299	34.94	57.65	7.5	3512
7 (Baden-Württemberg incl. Stuttgart)	0.252	35.60	60.62	8.7	3495
8 (Southern Bavaria incl. Munich)	0.276	55.34	94.62	7.9	5393
9 (Northern Bavaria incl. Nuremberg; Western Thuringia)	0.245	56.47	102.91	7.0	4367
Total (Germany)	0.260	51.39	94.30	81.1	46,414

Note: [a]Discounted present value over a five-year period (for people $\geq$ 16 years).

is interesting because it could have been assumed that the effect is similar to AFFECT. Sharing results with policy makers may be a precondition that results can affect policy decisions; yet, this is not related for the respondents of our survey.

Several socio-demographic characteristics significantly affect the amount of WTP. As in other studies, males report higher WTP than females (Coates and Szymanski, 2015), age reduces WTP (Walton et al., 2008), and WTP rises with income (Preuss and Werkmann, 2011). People with more education (SCHOOLING) have higher WTP, perhaps because they are more likely to anticipate the positive effects of hosting the Games for the country as a whole.

Table 4 includes average and aggregate WTP by postcode area and a description of the cities and states in those postcode areas. The table reveals large differences in average WTP between regions, ranging from €31 in Hanover (postcode 3) to €100 around Cologne (postcode 5). The significant negative effects in the models for POS_WTP and LN(WTP) support the relatively low WTP in the Hanover region. Although the Hanover region is the third largest region in terms of total population, aggregate WTP is the second lowest among all regions.

Aggregate WTP is lowest in the Leipzig region (postcode 0). This region also has the lowest percentage of respondents (17%) willing to support the Games. The low support may be due to Leipzig's failed bid for the 2012 Summer Games; the city did not even reach the status of an official candidate city. This region is also less affluent than most others and may therefore be less willing to pay for large sporting events. For example, the Leipzig stadium was one of only two World Cup stadia in Germany for which the federal government had to cover a large part of the costs. Thus, if Germany decides to bid for the Summer Games in the future, the Hanover and Leipzig region should not be considered given their relatively low support.

The Leipzig bid for the 2012 Games was preceded by an intra-German competition with four other potential hosts: Stuttgart (postcode 7), Rhine-Main Region (Frankfurt; postcode 6), Düsseldorf Rhine-Ruhr (postcode 4), and Hamburg (postcode 2). The selection committee eliminated the first three early in the process in 2003. Hamburg lost the final round against Leipzig. Average WTP in the first three regions is about the same, € 35 to € 39, and low compared with other regions. Perhaps their earlier, unsuccessful bids contributed to weak support in Stuttgart and Frankfurt. Moreover, Stuttgarters may have been wary of large-scale projects amid long-lasting controversies surrounding Stuttgart 21, a contentious underground railway and urban development project. Similarly, ongoing debate about an expansion of Frankfurt's airport may have dampened support for yet another large project.

The Düsseldorf region has the strongest support (31%) for hosting the Games, significantly different from the Hamburg region in the positive WTP model. The higher support for sport in this region compared with other German regions may be because it is home to several traditional Football Bundesliga clubs, e.g., Dortmund, Schalke, Essen, Duisburg, Mönchengladbach. Residents of this region still seem to be supportive of the Summer Games despite the failed initiative in 2003. Nevertheless, more than two-thirds of respondents do not support hosting the Games, perhaps because the Ruhr area is included, a working-class region.

The Cologne region (postcode 5) lies south of the Düsseldorf region. Its € 100 average WTP, the highest, coupled with its second-highest population of all German regions gives it an aggregate WTP of € 10.8 billion, by far the highest of all regions. The high support might be expected in a region with several first division teams in football (FC Cologne, Bayer Leverkusen), ice hockey (Cologne Sharks, Krefeld Penguins), and handball (VfL Gummersbach). Furthermore, unlike many other major German cities, Cologne had not recently been disappointed by failed bids to host the Summer Games.

Hamburg (postcode 2) and Berlin (postcode 1) were considered for the 2024 bidding process. Public support, in terms of positive WTP and average WTP, is higher in the Berlin region, despite its failed bid for the 2000 Games. Perhaps the German Olympic Sports Confederation should have chosen Berlin as the candidate instead. But, maybe not; only 28.5% of respondents reported a positive WTP, far short of the 50% required for a referendum to pass.

The Munich region (postcode 8) also has a history of recent failed bids, for the 2018 Winter Games and the 2022 Winter Games, though the 1972 Munich Summer Games remain the only German-hosted Olympic Games since the Second World War. But most residents today do not remember or did not experience the 1972 Games and their WTP is close to the overall German average.

The WTP aggregated over all regions over a five-year period exceeds € 46 billion (Table 4), far greater than the estimated € 7.4 billion cost of hosting the 2024 Hamburg

Games (Hamburg, 2015). The expectation was that the federal government would cover € 6.2 billion; yet, it only acknowledged this figure without making any commitments. The aggregate WTP for the Hamburg region (postcode 2) was € 3.9 billion, enough to cover the difference between the estimated cost and the expected federal contribution. Since non-response bias could not be fully addressed in this study, those who do not care about Olympic Games are likely to have a lower WTP. To the extent that this is true, estimated aggregate WTP is biased upward.

This study has implications for policy makers. Since only 26% of respondents expressed a positive WTP, it will be hard for a referendum to win a majority in the future. It may be more promising to use payment vehicles other than tax increases. Another implication would be to highlight the intangible effects in the public debate rather than any economic impact estimates when discussing the possible benefits of hosting. Research on mega events such as the Olympic Games has focused on the potential economic and tourism development impacts of hosting (Baade et al., 2010; Feddersen and Maennig, 2013), and hosting in the context of inter-urban competition (Andranovich et al., 2001; Hiller, 2000; Richards and Wilson, 2004; Whitelegg, 2000). The findings here suggest that a more powerful (and perhaps realistic) argument for hosting may be the public goods benefits local residents receive, rather than any forecasted economic impacts.

Conclusion

In light of two failed German referenda on hosting Olympic Games, this study used CVM to examine German public support for hosting Olympic Summer Games. The results suggest that about one-quarter of respondents are willing to pay higher taxes to host the Games, that aggregate German WTP exceeds estimated costs, but that using taxes as the payment vehicle would doom any referendum to host the Games. Results revealed large differences in WTP across regions, with the Cologne region reporting the highest average and total WTP – a finding which should be considered when selecting potential hosts in the future. The perception of positive intangible effects of the Olympics (happiness derived from sporting success, athletes as role models) had a positive effect on prestige and WTP. Consequential surveys also lead to greater WTP for two reasons: more respondents are willing to pay positive amounts and the magnitude of WTP is higher.

The limitations of this study represent opportunities for future research. CVM researchers should examine the sensitivity of WTP to alternative payment vehicles. Tax increases as a payment vehicle enhance perceived consequentiality which increases WTP. But, dislike of taxes may decrease WTP. It would be interesting to see if the likelihood of a positive WTP and the amount of WTP differ when the scenario involves payment vehicles other than tax increases. Similarly, the impact of consequentiality should also be examined in future studies with varying payment vehicles.

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